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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/763,655

01/23/2004

Chien Chou

CU-3548 RJS

9381

26530

7590

12/14/2005

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EXAMINER

LYONS, MICHAEL A

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/763,655

Applicant(s)

CHOU ET AL.

Examiner

Michael A. Lyons

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>012304</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As claimed, in dependence of claim 1, claim 8 provides a P polarized beam only to the scattering medium, with the S polarized beam being provided to the reference. As such, only a P polarized beam would reach the polarizing beam splitter claimed in the method of claim 8 to split the signal beam returning from the scattered medium. Since there is no S polarized light in the signal beam through the method of claims 1 and 8, no S polarized signal light, on its own, can be detected as claimed, since P polarized light cannot be split from itself by a polarizing beam splitter, leaving the functionality of the claim vague and indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-7 are rejected under 35 U.S.C. 102(a) as being anticipated by Chan et al (“The measurement of optical properties of a multiple scattering medium based on diffused photon pair density wave”).

Regarding claim 1, Chan (Fig. 1) discloses a method for measuring properties of a multiple scattering medium, this method comprising outputting a coherent light beam using a Zeeman laser that has linear polarized light P and S wave components having a respective frequency, splitting the coherent light beam into a signal beam and reference beam at beam splitter BS, the signal beam being the P wave and the reference beam the S wave, projecting the signal beam through a signal fiber into the scattering medium, detecting the reference beam at a reference detector and the signal beam at a signal detector and converting them into heterodyne interference electrical signals, comparing the two signals to obtain amplitude intensity attenuation and phase delay of the signal beam, and then inferring optical properties of the scattering medium from the amplitude attenuation and phase delay (pages 263-265).

As for claims 2-3, Chan discloses a Zeeman laser (page 263).

As for claim 4, Chan discloses the use of a signal fiber to take the signal beam from the beam splitter to the scattering medium and a detector fiber to take the beam from the medium to the signal detector (Fig. 1).

As for claim 5, Chan discloses the use of a linear amplifier and a band pass filter to amplify and filter the signal beam (Fig. 1, page 263).

As for claim 6, “when both P and S waves pass a polarizer, they convert into a pair of parallel polarized photons” (page 260) which then pass through beamsplitter BS to be split into a signal and reference beam.

As for claim 7, the band pass filter’s central frequency is the beat frequency, which is the difference between the frequency of the signal beam and the frequency of the reference beam (page 260).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al (“The measurement of optical properties of a multiple scattering medium based on diffused photon pair density wave”) in view of Chou et al (6,327,037), as best understood by the examiner.

As for claim 8, Chan discloses the claimed invention with regards to claim 1 above except for the splitting of the signal beam after penetrating the scattering medium.

Chou (Fig. 1), however, discloses the use of a polarizing beam splitter 12 after the test object that splits the signal beam into P and S polarizations, with individual detectors 13 and 14 and band pass filters 15 and 16, a signal processor 17, and an amplitude detector 21.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add the polarizing beam splitter after the scattering medium of Chan as per Chou, the motivation being that separating the signal beam into its corresponding polarizations will allow for an additional detection and measurement of the signal beam based on polarization, leading to more accurate and refined measurements of the optical properties of the scattering medium.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chan et al (“The measurement of optical properties of a multiple scattering medium based on diffused photon pair density wave”) in view of Heffer et al (“Quantitative oximetry of breast tumors”).

Regarding claim 9, Chan discloses the claimed method as discussed above with regards to claim 1. Chan fails to disclose moving the position of incidence of the signal beam into the scattering medium, repeating the measurement method multiple times, one for each movement of the signal beam, and reconstructing the measured properties of the scattered medium based on the location of the signal beam.

Heffer, however, discloses (Fig. 2) the movement of the input signal fiber in relation to the detector fiber and the scattering medium and repeating the imaging process during the movement of the fiber, and then recorded and translated the amplitude and phase of the detected modulated intensity into measurements of the reduced scattering and absorption coefficients by employing a multidistance method based on the diffusion equation and semi-infinite boundary conditions (page 3831, column 1).

Therefore, it would have been obvious to move the position of incidence of the signal beam of Chan by moving the fiber and performing the subsequent calculations as per Heffer, the motivation being that moving the fiber will allow for more of the scattering medium to be measured by the device so that variations of the properties of different portions of the scattering medium can be measured and accounted for.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Pat. 5,428,447, a method and apparatus for obtaining three-dimensional information of samples using computer tomography to Toida, and US Pat. 6,526,298, a method for the non-invasive determination of analytes in a selected volume of tissue to Kahlil et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Lyons whose telephone number is 571-272-2420. The examiner can normally be reached on Monday through Friday.

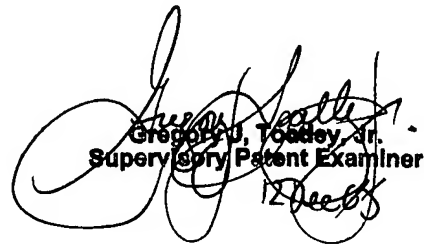
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley can be reached on 571-272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2877

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAL

December 8, 2005


Gregory J. Tiedley, Jr.
Supervisory Patent Examiner
12 Dec 05